

LISTING OF CLAIMS:

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1. (Currently Amended) A method for use in monitoring a patient, comprising the steps of:

obtaining a time-based photoplethysmographic ("pleth") signal that is modulated based on interaction of a transmitted optical signal with blood of said patient;

transforming said time-based pleth signal into a frequency domain to obtain spectral information including first information associated with a fundamental frequency of said pleth;

processing said ~~pleth-signal~~ spectral information to identify an effect related to a Mayer Wave; and

providing an output related to said Mayer Wave effect.

2. (Original) A method as set forth in Claim 1, wherein said step of processing comprises identifying a variation in blood volume.

al 3. (Currently Amended) A method as set forth in Claim 1, wherein said step of processing comprises extracting from said ~~pleth-signal~~ spectral information -information regarding at least one of the amplitude and the frequency of the Mayer Wave.

4. (Currently Amended) A method as set forth in Claim 1, wherein said step of processing comprises filtering the ~~pleth-signal~~ spectral information -to extract information regarding the Mayer Wave.

5. (Currently Amended) A method as set forth in Claim 4 wherein said step of filtering comprises band pass filtering the spectral information ~~pleth-signal~~ using a frequency band that passes a spectral peak of said spectral information ~~pleth-signal~~ located between about 0.05 Hz and 0.5 Hz.

6. (Currently Amended) A method as set forth in Claim 4, wherein said step of filtering comprises band pass filtering the spectral information ~~pleth-signal~~ using a frequency band that passes a spectral peak of the spectral information ~~pleth-signal~~ located at about 0.1 Hz.

7. (Original) A method as set forth in Claim 1, wherein said step of providing an output comprises providing a graphical output that shows at least one of an amplitude and a frequency of the Mayer Wave.

8. (Original) A method as set forth in Claim 7, further comprising monitoring one of said amplitude and said frequency over time to detect a variation of interest.

9. (Currently Amended) A method as set forth in Claim 1, wherein said step of processing comprises first analyzing said spectral information ~~pleth-signal~~ to obtain heart rate information.

10. (Currently Amended) A method as set forth in Claim 9, wherein said step of first analyzing comprises determining a fundamental frequency associated with a heart rate of the patient from said spectral information ~~period of a waveform of said pleth signal~~.

11. (Currently Amended) A method as set forth in Claim 9, wherein said step of first analyzing comprises filtering said spectral information ~~pleth-signal~~ to obtain said heart rate information.

12. (Original) A method as set forth in Claim 9, wherein said step of processing further comprises monitoring said heart rate information over time to obtain a time series of heart rate values.

13. (Original) A method as set forth in Claim 9, wherein said step of processing further comprises second analyzing said heart rate information to obtain information regarding heart rate variability.

14. (Original) A method as set forth in Claim 9, wherein said heart rate information comprises a time series of heart rate values and said step of processing further comprises filtering said time series of heart rate values to identify a low frequency variability therein.

15. (Original) A method as set forth in Claim 14, wherein said low frequency variability is in the range between about 0.05 Hz and 0.5 Hz.

al 16. (Original) A method as set forth in Claim 14, wherein said low frequency variability is at about 0.1 Hz.

17. (Currently Amended) A method for use in monitoring a patient comprising the steps of:

obtaining a time-based photoplethysmographic (“pleth”) signal that is modulated based on interaction of a transmitted optical signal with blood of said patient;

transforming said time-based pleth signal into a frequency domain to obtain a spectral information signal;

processing said spectral information signal ~~pleth-signal~~ to obtain information regarding a low frequency blood volume variation of said patient, said low frequency blood volume variation relating to a spectral peak of said spectral information signal ~~pleth-signal~~ located between about 0.05 Hz and 0.5 Hz; and

monitoring said low frequency blood volume variation over time to identify a characteristic of interest.

18. (Currently Amended) A method as set forth in Claim 17, wherein said step of processing comprises band pass filtering the spectral information signal ~~pleth-signal~~ using a frequency band that passes a spectral peak of the spectral information signal ~~pleth-signal~~ located between about 0.05 Hz and 0.5 Hz.

19. (Currently Amended) A method as set forth in Claim 17, wherein said step of processing comprises band pass filtering the spectral information signal ~~pleth-signal~~ using a frequency band that passes a spectral peak of the spectral information signal ~~pleth-signal~~ located at about 0.1 Hz.

20. (Original) A method as set forth in Claim 17, further comprising the step of providing a graphical output that shows at least one of an amplitude and a frequency of the low frequency blood volume variation.

21. (Original) A method as set forth in Claim 20, wherein said step of monitoring comprises monitoring one of said amplitude and said frequency over time to detect a variation of interest.

22. (Currently Amended) A method for use in monitoring a patient, comprising the steps of:

obtaining a time-based photoplethysmographic ("pleth") signal that is modulated based on interaction of a transmitted optical signal with blood of said patient;

performing a Fourier transformation on said time-based pleth signal to transform said time-based pleth signal into a spectral information signal in a frequency domain;

first processing said spectral information signal ~~pleth signal~~ to obtain heart rate information;

second processing said heart rate information to obtain information regarding heart rate variability; and

monitoring said heart rate variability information to identify a characteristic of interest.

23. (Currently Amended) A method as set forth in Claim 22, wherein said step of first processing comprises determining a fundamental frequency period of a waveform of said spectral information signal ~~pleth signal~~.

24. (Currently Amended) A method as set forth in Claim 22, wherein said step of first processing comprises filtering said spectral information signal ~~pleth signal~~ to obtain said heart rate information.

25. (Original) A method as set forth in Claim 22, wherein said step of first processing comprises obtaining a time series of heart rate values.

26. (Original) A method as set forth in Claim 22, wherein said heart rate information comprises a time series of heart rate values and said step of second processing comprises filtering said time series of heart rate value to identify a low frequency variability therein.

27. (Original) A method as set forth in Claim 26, wherein said low frequency variability is in the range between about 0.05 Hz and 0.5 Hz.

28. (Original) A method as set forth in Claim 26, wherein said low frequency variability is at about 0.1 Hz.

29. (Currently Amended) A method for use in monitoring a patient, comprising the steps of:  
configuring a photoplethysmographic (“pleth”) instrument relative to a patient for a pleth analysis;  
causing a respiration rate of said patient to be at least at a given threshold, wherein a frequency of said respiration rate is elevated above a frequency range associated with a Mayer Wave;  
first operating said pleth instrument to obtain a pleth signal for said patient; and  
second operating said pleth instrument to process said pleth signal for identifying an effect related to a said Mayer Wave and providing an output related to said Mayer Wave effect.

30. (Original) A method as set forth in Claim 29, wherein said step of configuring comprises applying a probe of said instrument to said patient so as to transmit an optical signal to perfused tissue of said patient.

31. (Original) A method as set forth in Claim 29, wherein said step of causing comprises instructing said patient to breathe at at least a predetermined threshold.

32. (Original) A method as set forth in Claim 31, wherein said predetermined threshold is at least 10 breaths per minute.

33. (Original) A method as set forth in Claim 31, wherein said predetermined threshold is at least 20 breaths per minute.

34. (Original) A method as set forth in Claim 29, wherein said step of causing comprises controlling said patient’s respiration rate with a respirator.

35. (Original) A method as set forth in Claim 29, wherein said step of second operating comprises causing said instrument to process said pleth signal to obtain heart rate information and process said heart rate information to obtain information regarding heart rate variability.

36. (Original) A method as set forth in Claim 29, wherein said step of second operating comprises causing said instrument to process said pleth signal to obtain information regarding a low frequency blood volume variation of said patient.

37. (Currently Amended) An apparatus for use in monitoring a patient, comprising:  
a port for receiving a time-based photoplethysmographic (“pleth”) signal that is modulated based on interaction of a transmitted optical signal with blood of said patient;  
a processor for first processing said time-based pleth signal to generate a frequency-based spectral information signal and for second processing said spectral information signal to identify an effect related to a Mayer Wave; and  
an output device for providing an output related to said Mayer Wave effect.

38. (Original) An apparatus as set forth in Claim 37, wherein said processor is operative for identifying a variation in blood volume.

39. (Currently Amended) An apparatus as set forth in Claim 37, wherein said processor is operative to filter the spectral information signal ~~pleth signal~~ to extract information regarding the Mayer Wave.

40. (Original) An apparatus as set forth in Claim 37, wherein said output device is operative to provide a graphical output that shows at least one of an amplitude and a frequency of the Mayer Wave.

41. (Currently Amended) An apparatus as set forth in Claim 37, wherein said processor is operative for analyzing said spectral information signal ~~pleth signal~~ to obtain heart rate information.

42. (Original) An apparatus as set forth in Claim 41, wherein said processor is further operative for analyzing said heart rate information to obtain information regarding heart rate variability.

43. (New) A method as set forth in Claim 1, wherein said step of processing comprises obtaining a time series of heart rate values associated with said fundamental frequency.

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44. (New) A method as set forth in Claim 43, wherein said step of processing further comprises processing said time series of heart rate values to identify a low frequency variability therein.

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